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# T-KEEPING for profit

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INDIAN COUNCIL OF AGRICULTURAL RESEARCH
NEW DELHI

*This is the fourth of a series of Bulletins planned by the Indian Council of Agricultural Research to meet the paucity of literature in a simple, yet authoritative form and dealing with farming and animal husbandry subjects. Each of the Bulletins is so written as to give a general picture of farming practices in vogue in the country, and suggest improvements based on research results. The Bulletins, it is hoped, will be found useful by the farmer, the agricultural student and the Extension worker alike.*

**Editor :** M. G. KAMATH

December 1954

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# OAT-KEEPING FOR PROFIT

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A Champion Jamnapari Buck

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# THE GOAT IN INDIA

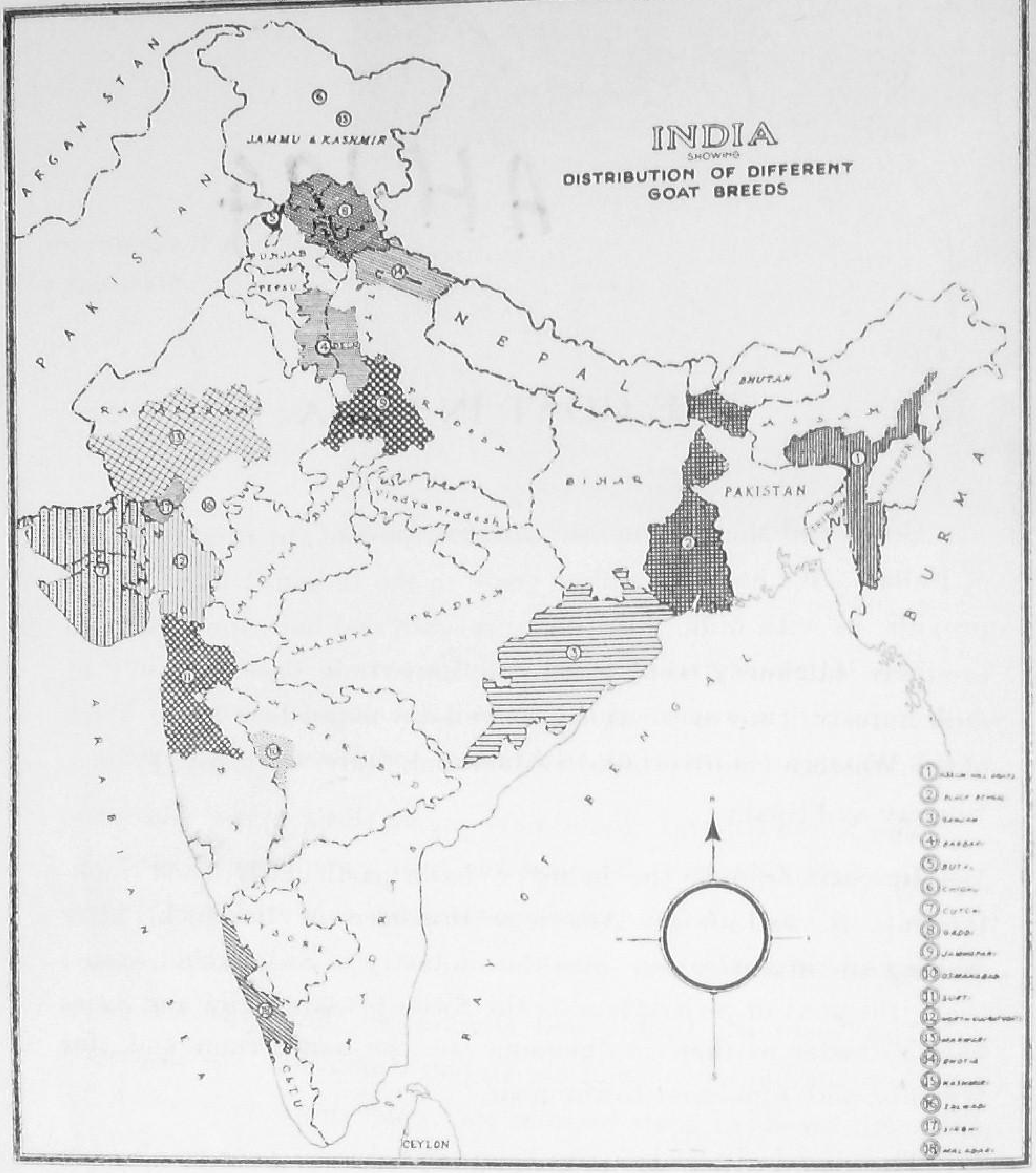
Goats and sheep form an integral part of the rural economy of India. We have 47 million goats in the Indian Union, which provide us with milk, meat, manure, skin and hair, the first two products obviously being the more important ones. The goat milk industry, however, is not so well developed here as in some of the Western countries like Switzerland, Italy, Germany, France, Norway and Spain.

In Switzerland, the industry has a particularly good reputation. A well known American importer of livestock, after making an investigation into the industry in Switzerland, stated that "the goat of Switzerland is the Swiss peasant's cow and Swiss baby's foster-mother, a blessing to the sanatorium and for invalids, and a godsend to the poor."

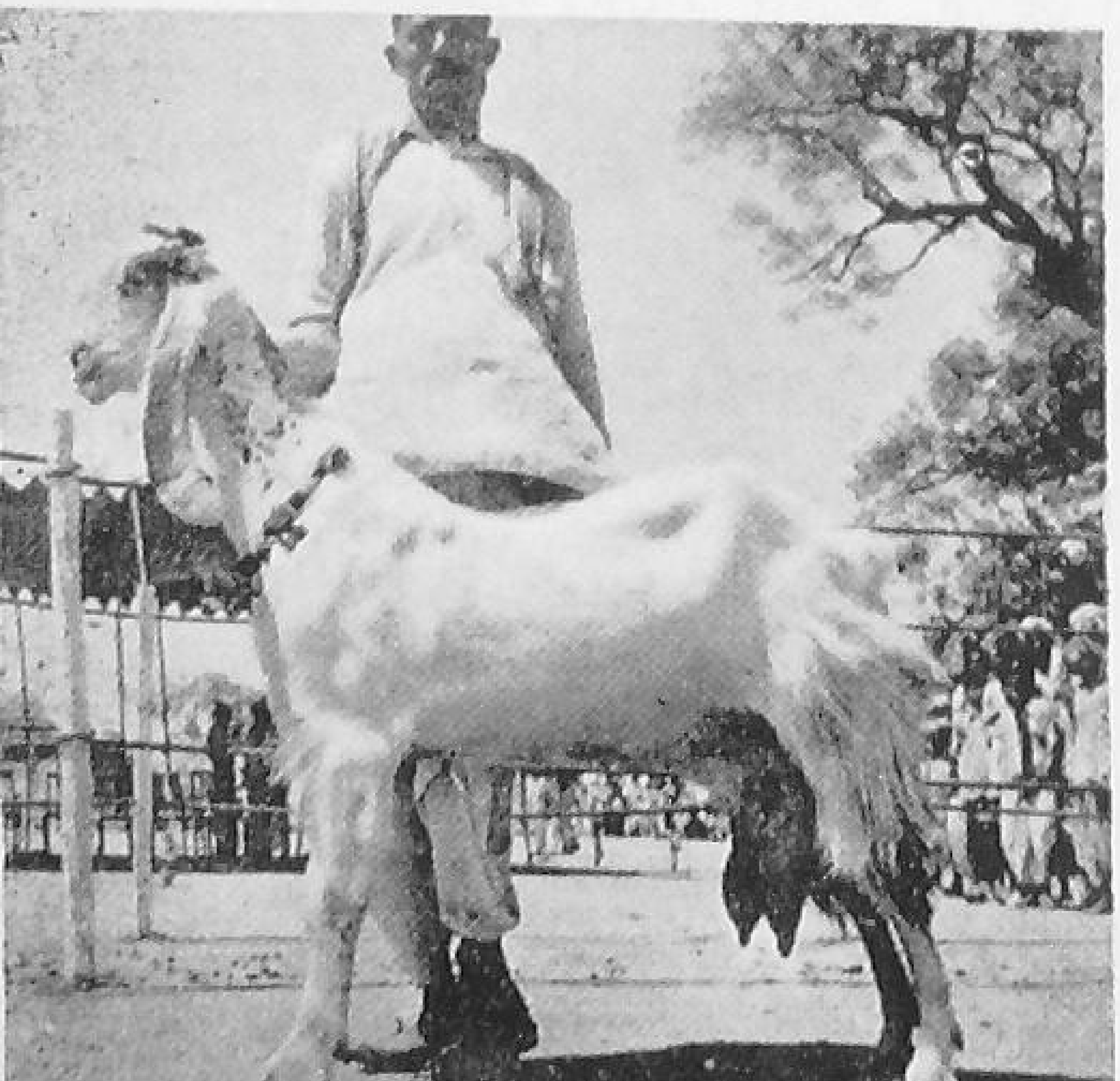
The goat in India has also been termed the poor man's cow because of its hardiness, its power to survive where a bigger and costlier animal would die of starvation and its capacity to turn food material, which normally would be a waste otherwise, into milk and meat, thus providing a very cheap source of milk for people who ordinarily cannot afford to buy milk because of high cost.

There are several distinct breeds of goats in India, maintained for their milk, meat and manure; only in hilly tracts some goats are kept for their hair, which is exported abroad.

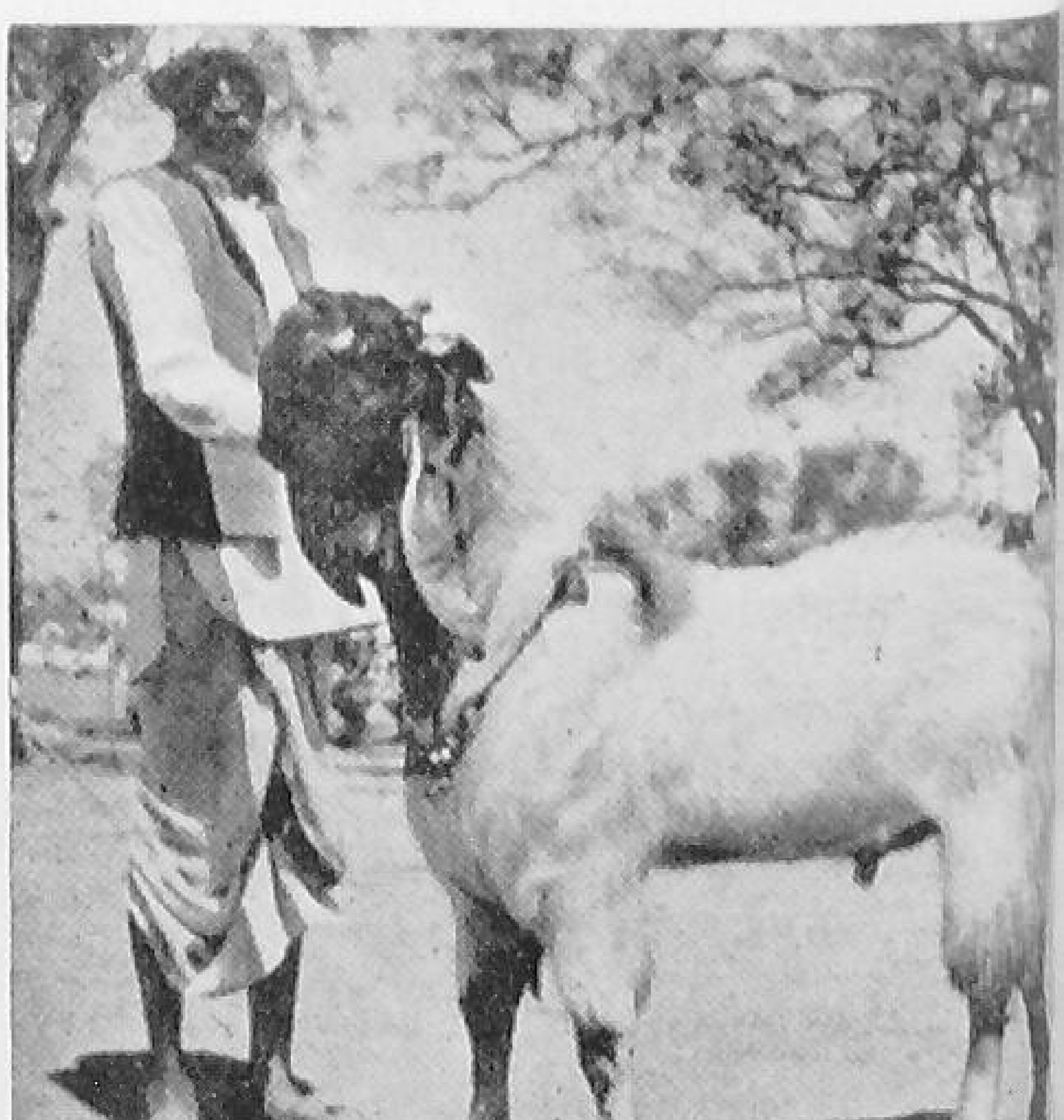
The well known breeds are Jamnapari, Beetal, Barbari, Cutchi, Osmanabadi, Bengal (of which there are three types—black, brown and the white-bearded), Surti, Malabari, North Gujerat, Sirhoi and hill goats.




A Jamnapari Doe



A Champion Jamnapari Buck



A KASHMIR OR PASHMINA GO

The Malabari goat of today is not a pure-bred animal, but is a mixture of two or more types with a preponderance of Surti blood, which owes its origin to Arabian and Mesopotamian goats.

The North Gujerat goats have again three types: Marwari, Mehsana and Zalwadi. The last two bear a great resemblance to the Cutchi, which in fact can be considered as one of the types of North Gujerat goats.

The Kashmiri, Gaddi, and Chighu are hill types of goats found on the border areas of the Indian Union, but are described as Indian breeds of goats because they come down quite often to areas in the Indian territory for grazing.

The Assam hill goats are like the white hill goats seen in the Kangra and Kulu Valley, but have been described as a distinct breed. There is also the famous Pashmina goat found in Gilgit, Ladakh, Tibet and also seen in Tehri and Almora districts during the winter. *Pashmina*, one of the finest textile fibres in the world, is obtained from the undercoat of this goat. The goat has also been named as the Kashmir goat, though very few specimens are seen in the Kashmir valley proper.

In addition to these, there are others which are considered by some as distinct breeds, and by others as types, and as such their names are not mentioned here.

The Jamnapari, Beetal and Barbari are in great demand

A BEETAL GOAT

because of their milk-producing qualities. These have been specially bred at various Government farms for providing bucks of approved quality to rural areas for improving the indigenous or nondescript varieties.

In the extreme south, the Malabari and Surti goats meet the local milk requirements to a considerable extent.

The body measurements and the average milk yield of the three well known breeds are given below :

| Name of breed | Length from the tip of the nose to the root of the tail (in inches) | Height from the hoof to withers (in inches) | Body weight of adult male (in pounds) | Average milk yield (in pounds) |
|---|---|---|---|---|
| Jamnapari male | 50 to 54 | 36 to 40 | 150 to 200 | — |
| Jamnapari female | 46 to 50 | 30 to 34 | 100 to 140 | 6 |
| Beetal male | 50 to 52 | 37 to 39 | 145 to 190 | — |
| Beetal female | 42 to 48 | 30 to 33 | 100 to 135 | 4 |
| Barbari male | 38 to 44 | 26 to 30 | 80 to 100 | — |
| Barbari female | 36 to 44 | 24 to 28 | 60 to 80 | 2.5 |

Jamnapari goats have given as much as 13 lb., and Barbari, five to six pounds of milk in a day in milk competitions.

# HOUSING

In some countries, where the goat milk industry is well developed, they have regular goat dairies, with adequate arrangements for feeding, milking, cooling and storage of milk, etc.

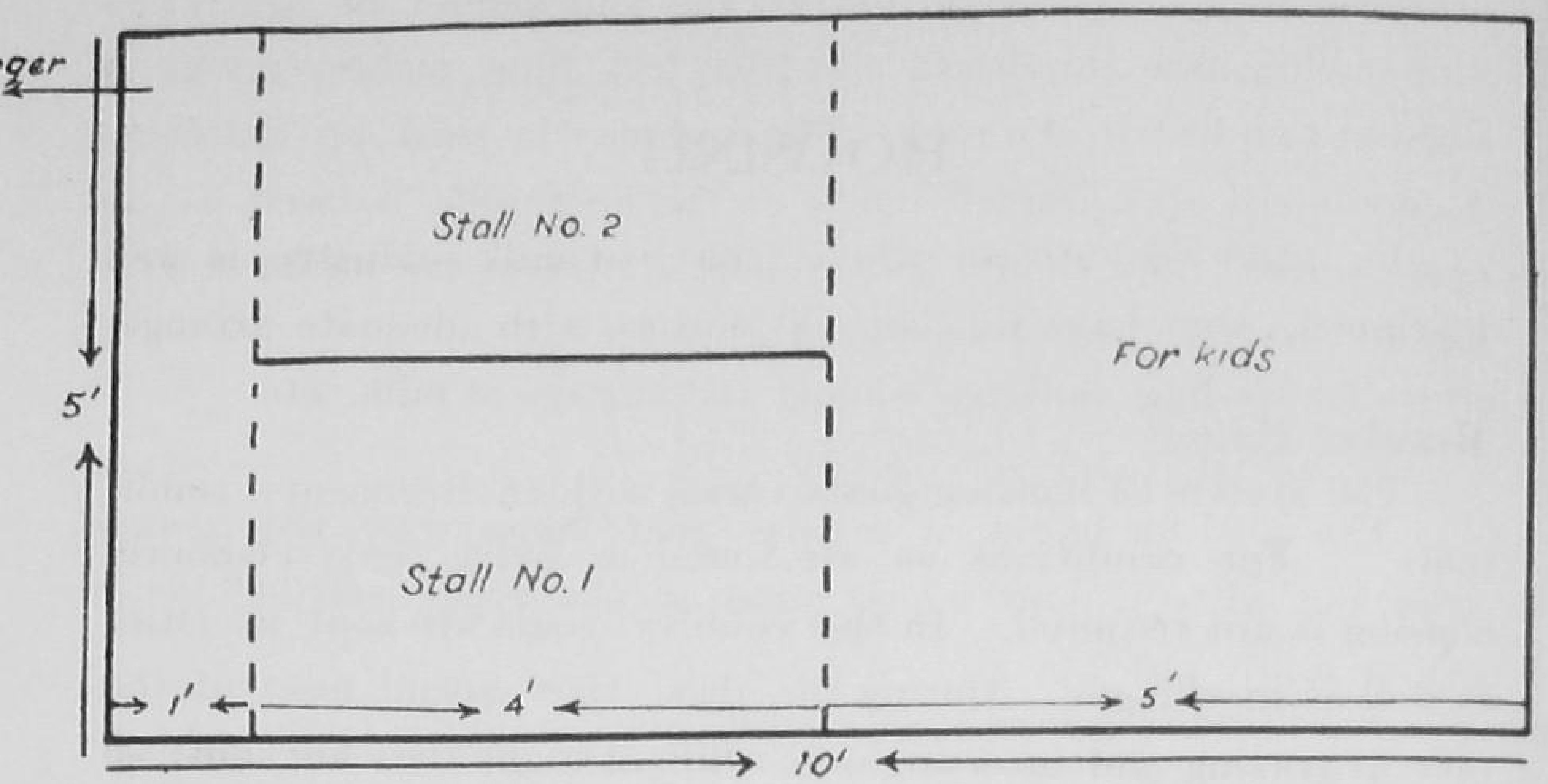
The system of housing goats varies with environmental conditions. For conditions as are found in India, any elaborate housing is not required. In this country, goats are kept in cities as well as in villages. During the day, they spend most of the time in grazing and browsing out, while at night they are shut up in some corner of the house or tied under a tree or on a sheltered verandah.

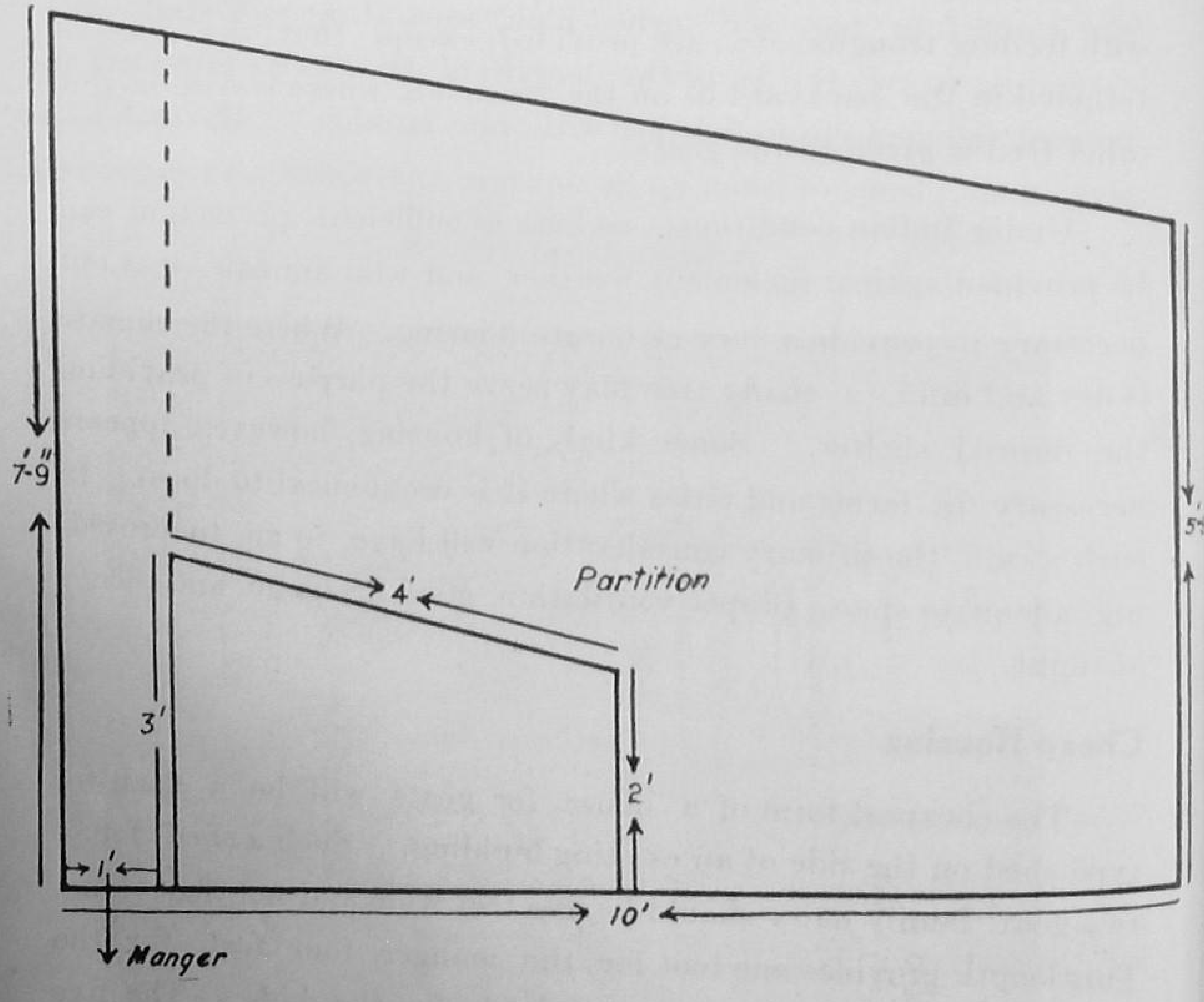
In towns, where stall-feeding is practised, no special houses with feeding troughs, etc., are provided, except that the goat is tethered in the backyard or on the verandah, where leaves, hay or other feed is given to the goats.

Under Indian conditions, as long as sufficient protection can be provided against inclement weather and wild animals, it is not necessary to provide a very elaborate housing. Where the climate is dry and mild, a shady tree may serve the purpose of providing the desired shelter. Some kind of housing, however, appears necessary in farms and cities where it is economical to do so. In such a case, the primary consideration will have to go to providing adequate space, proper ventilation, good drainage and plenty of light.

## Cheap Housing

The cheapest form of a house for goats will be a 'lean-to' type shed on the side of an existing building. Such a shed for a two-goat family dairy should be five feet wide and ten feet long. This length provides one foot for the manger, four feet for the goats, with five feet to spare at the back for the kids. The five feet width is sufficient for the two milking does with a stub-wall




GROUND PLAN (TOP) AND ELEVATION (BOTTOM) OF A 'LEAN-TO' TYPE OF GOAT SHED

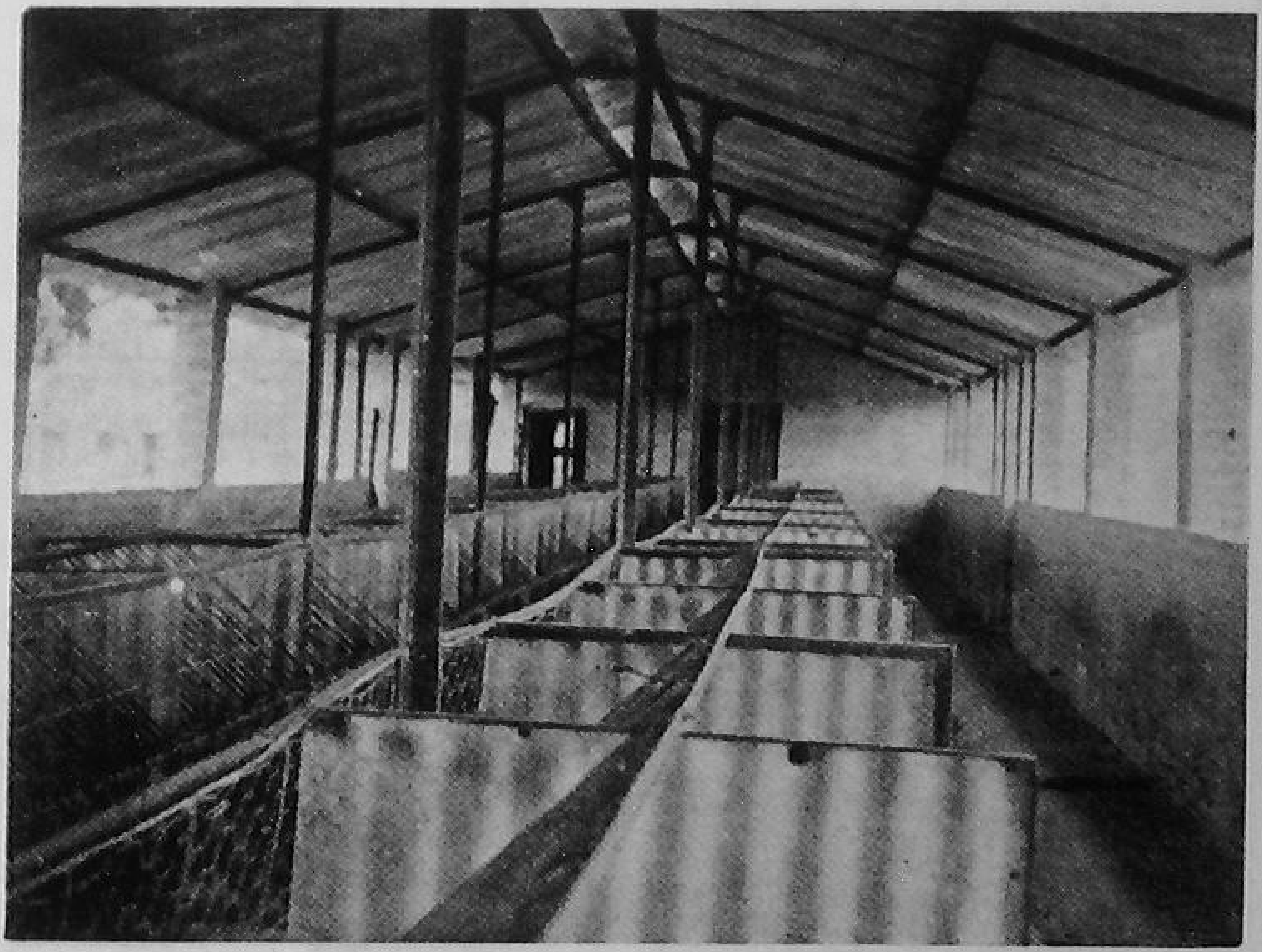
between them. The height nearest the wall should be seven feet nine inches and the lower side five feet nine inches, giving a slope of two feet to the roof. The roof may be tiled or thatched. A good-sized open frame window on the lower side as well as an open framed door should be provided. Arrangements for storing hay or dried feed can be made overhead.

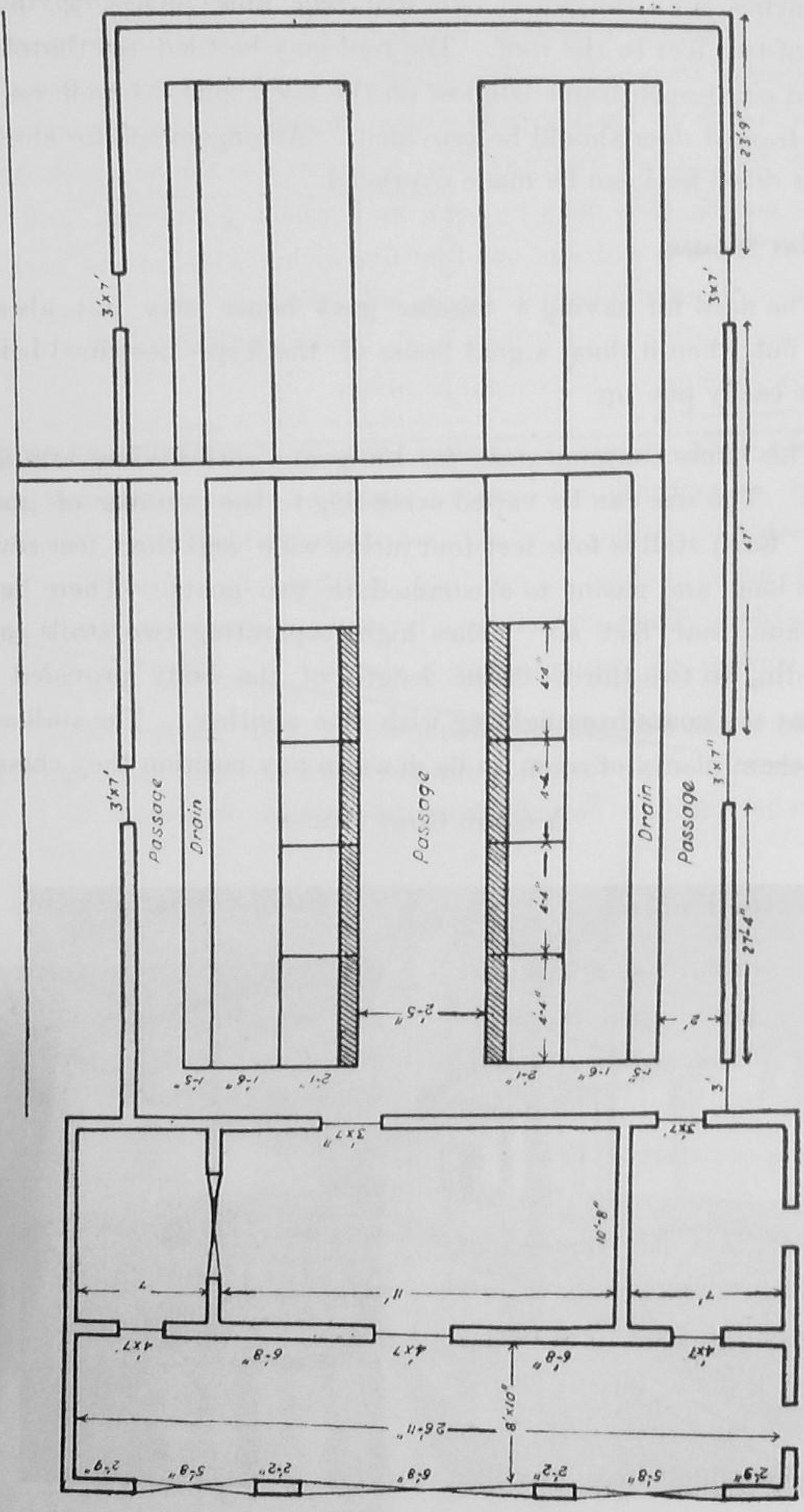
## Regular House

The need for having a regular goat house may not always arise, but when it does, a goat house of the type described below can be easily put up.

This house contains stalls for 100 goats, with feeding arrangements. The size can be varied according to the number of goats kept. Each stall is four feet four inches wide and three feet seven inches long, and meant to accommodate two goats. There is a partition, four feet six inches high, separating two stalls and extending to two-thirds of the length of the body provided to prevent the goats from fighting with one another. The stall also gives them plenty of room to lie down in any position they choose.

A Good Goat House






Plan of an Improved Goat House

Each stall is provided with an arrangement for tying up the goats. There is a passage, two feet five inches wide, between the two rows of the stalls. The partition wall has circular holes for accommodating feeding pails which should be twenty inches to twenty-four inches from the floor. In front is the hay rack where hay or leaves, etc., may be kept and which goats can pull out from. There is a drain, one foot five inches wide, at the back of each row of stalls followed by a side passage, two inches wide. The surrounding wall is built with bricks up to a height of five feet six inches, with wire gauze above.

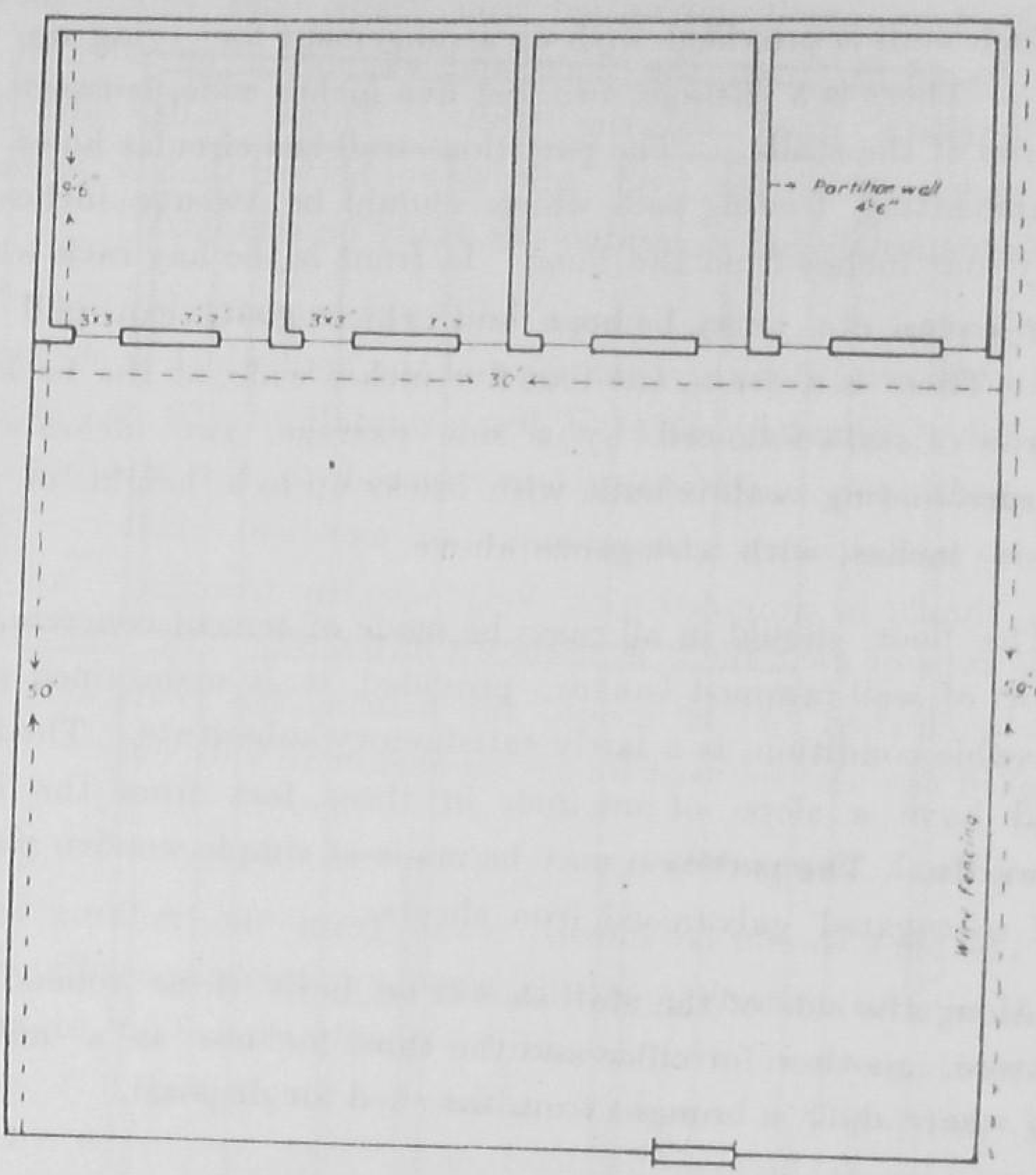
The floor should in all cases be made of cement concrete, but a floor of well rammed *kankar*, provided it is maintained in a serviceable condition, is a fairly satisfactory substitute. The floor should have a slope of one inch in three feet from the head backwards. The partition may be made of simple wooden planks or of corrugated galvanised iron sheets.

Along the side of the stall should be built three rooms, one for store, another for office and the third for use as a milking room where milk is brought from the shed for disposal.

## For Town Flocks

In towns, if a single goat is to be maintained, it can be housed in any building, provided it is dry, free from draughts and well ventilated. The space required should not be less than 6 ft. × 4 ft. Instead of providing a manger or trough to receive the feed, it is better to have a plain board, eleven inches wide and one inch thick, in which two circular holes are cut large enough

A SINGLE STALL SHOWING HAY RAC




GROUND PLAN OF A SIMPLE TYPE OF GOAT SHED

AN OPEN GOAT SHED

to take two small galvanised iron pails, and which should be 20 to 24 in. from the floor and supported on wooden or iron brackets fixed to the wall. These pails, one for water and the other for food, will serve better than a manger, as the accumulated food residue can easily be removed.

The plan for a goat house will vary considerably according to climatic conditions and the type of the herd which is sheltered. In a dry climate, with a low rainfall of 20 to 30 in., long sheds open on the sides, less exposed to the weather and built on well drained ground make an excellent shelter. These sheds should be provided with long wooden troughs. Another simple type of goat shed is as shown in the adjoining illustration. Here, each shed 'A' is meant for housing ten goats and kids. The shed can also be used for giving shelter to kids only.

**House Buck Separately**

The buck should be housed away from the milking goats. It can be a rather strong smelling animal at times, specially during the mating season, and the smell is readily carried on to everything with which it comes in contact. A single stall 8 ft. × 6 ft. with the usual fittings for food and water, would be suitable for the buck.

## FEEDING

Goats are kept under varying conditions in India. In rural areas and under village conditions, they are maintained on grazing and browsing alone. Flocks are driven out daily to pick up whatever is available on the ground or from trees and bushes in the common grazing areas. Concentrates are occasionally fed to milk goats.

In cities, large flocks are maintained mainly for the supply of milk. These goats are mainly stall-fed, but are usually also sent out for exercise and to pick up whatever is available from the loppings of trees by the roadside. There is also the poor individual who maintains a goat or two for the supply of milk for

his family. He tethers his animals just outside his house and by the side of the road. These animals are usually stall-fed and are seldom sent out for grazing.

Goats prefer browsing on small bushes and flourish on loppings of trees. They are very versatile by nature and often dash from bush to bush. The flocking instinct in them is less marked than in sheep, and for that reason one has to be much more careful to see that they do not stray away from the flock.

**Tethering**

When only one or two goats are kept, it is best to tether them on a grassy plot when available. This can usually be done by means of a light chain or rope attached to an iron *khonti* driven into the ground. The tether must allow sufficient movement, say, of about 20 yards all round. The *khonti* should be moved to a fresh spot as and when necessary, driven into the ground level to prevent the chain or rope from getting wound round it.

An unfortunate aspect of goat-feeding in the villages is the reckless lopping of trees, rendering many a fertile land barren of vegetation. This is where goat-rearing tells badly upon the forest as well as upon the general economy of the country. This handicap can, however, be overcome if lopping or browsing of trees is done judiciously without in any way jeopardising the life of the trees. Goatherds should realise that lopping trees recklessly will result in cutting the very base of their existence.

**Feed Precautions**

When goats have to be stall-fed, as in towns, strict cleanliness should be observed with regard to the receptacle and the food. A variety in the food given is very essential as no other animal tires of a monotonous diet so rapidly as the goat.

It is necessary to obesrve the following precautions in the stall-feeding of goats.

Whatever the food, it should be clean and fresh and without any signs of fermentation.

The pails or feeding troughs should be very clean and all left-overs of a meal should be removed before putting in fresh food in them.

No food should be given over and above what can be consumed readily at one time, as there is no animal more wasteful in its food habits than the goat.

Feeding should be done at regular hours, which will keep the appetite of the goat more even and make the animal enjoy its food better.

Hay should always be supplied sparingly, as any excess of it will be wasted as litter.

It is always advisable to furnish green grass or green leaves each day, as such succulent juicy articles help to develop a good supply of milk and also keep the body in a healthy condition.

Leaves or grass in wet condition should not be fed fresh, but be first dried before feeding. Likewise, in the early monsoon when the new grass is fresh and tender, it is dangerous to allow goats to eat very much of it any one time, and such grass should be fed sparingly.

**Daily Ration**

The feed given to goats should contain food material for maintenance purposes as well as for production. That part of it which is given for maintenance will be utilised for providing energy for the ordinary functions of the body and that part of the feed given as production ration will be used for growth in young animals, for the production of milk in milch animals, for the growth of the young in pregnant animals and for the production of 'condition' in meat animals.

Some concentrates such as gram and its byproducts, wheat bran or husk or gram kernels are fed to milch goats according to

their milk yield. Pods of the *babul* (*Acacia arabica*) tree when available, or *pala* or *jhar beri* (*Ziziphus nummularia*), a shrub found in the dry tracts, are relished by goats and are used as substitutes for concentrates. *Pala*, when it is nearly dry, is beaten off the shrub to remove the thorns and then collected.

Unless sufficient attention is given to the feeding of milkers, it is impossible to obtain the maximum yield of milk from them. A milch goat requires a ½ lb. ration for maintenance and five ounces of concentrate mixture for each pound of milk yielded.

As a general rule, a concentrate mixture, at the rate of 1 to 1¼ pound per day, and fodder (roughage) at the rate of four pounds per day should be fed to the goat during the lactation period. Though it is not customary to feed any concentrates at all during the dry period, it is advisable to feed it with half a pound of concentrates daily along with the roughage indicated above. The quantities fed will naturally vary slightly with the size of the breed.

**Concentrates**

The composition of the concentrate mixture will depend on the feeds available locally, and it would be economical to utilise what is locally available to prepare the mixture. For the mixture to be balanced, it should consist of three or four different feeds such as wheat bran, cake, gram or various pulse *chunies*, maize, etc. If changes have to be made in the diet, these should be brought about gradually, as any sudden change in diet is likely to upset the digestive system of the animal.

When the goat is going up in milk, she should be fed a little in excess of her needs so as to encourage her to do her best, but as soon as the extra feed given does not bring out any more increase in milk, it may be assumed that she has reached the maximum production possible and not given any more extra feed thereafter.

Breeders of Jamnapari goats in the Chakarnagar area of

Etawah district in Uttar Pradesh feed crushed wheat boiled in the form of *dahi*, to their goats to boost up milk yield. The highest yield in the day here has varied from 11 to 13 lb.

For the male, the same kind of ration can be used as for dry goats, but a little more will have to be given if they are to be fattened for meat. For the buck, the feed has to be on the same lines as for adult milkers.

## Salt with Feed

Providing salt and other licks is as important for goats as for other livestock. Salt licks should, therefore, be available at all times. Stall-fed animals can also be provided with small quantities of salt mixed with the daily grain ration to the extent of one per cent.

Minerals constitute an essential part of a goat's ration, as these are required for the body-building processes and also for the production of milk. The most important minerals required in the goat's ration are calcium and phosphorus, which can be made available to it by including bone-meal in the feed.

## Feeding Kids

The feeding of kids depends greatly on how they are reared. There are two methods of goat-rearing, natural rearing and hand-rearing, and each has its advantages and disadvantages. In this country, the natural method of leaving the kid to suckle its mother is practised, and rearing or hand-feeding is resorted to only when weaning is practised or if the mother dies.

Hand-rearing or feeding the kid with bottle and teat or from a pail is done in two ways. Both methods are learned easily, but bottle-feeding is better, the saliva taken along with milk while suckling helping in digestion. Kids get easily accustomed to feeding the foster-mother. It will only be necessary to put them on to the teats.

Usually, kids start nibbling after two weeks, but they should

be given concentrates after they are three months old. The quantity given can be about 1/8 lb., according to the season and availability. Hand-feeding is commonly practised by breeders of Barbari goats in Etah district of Uttar Pradesh. In fact, some of these goats become so accustomed to their owners hand-feeding them that they refuse to eat when the owner changes or when the feeding method is altered.

## BREEDING

The benefits of good feeding and housing will not be eviden unless attention is paid to systematic breeding. The goat comes into heat at intervals of 27 to 28 days throughout the year, the duration of heat lasting for 20 hours in summer and a little less in winter. The heat period in temperate climates lasts from two to five days, at intervals of three weeks from September to February. The average gestation period in the goat is 147 to 150 days.

### Mating Season

Mating should be carried out in such a way that kids are born in a season in which kid mortality is least. Different breeding seasons have therefore to be fixed for different parts of the country, depending upon the climate. In Uttar Pradesh (Etah), mating in the months of May, June and July and kidding in Octobor, November and December, while at Hissar, mating in March to July and kidding in the months of August to November, are found to be highly suitable.

### Right Mating Age

The doe should be mated at the right age and the buck put to service when fully mature. At the Hissar Farm where goats are kept in an environment akin to village conditions, the age of maturity for Beetal goats is one year and four or five months, the first kidding being at the age of one year and nine to ten months. In some areas, mating is carried out quite early. Sometimes, it is as early as at the age of six months, but it is best that the

goat is not mated till it is a year old.

The general rule is to breed from the females once a year, mating them after seven to eight months of their kidding. Occasionally, however, if the goat is not in kid, it is continued to be milked for two years or longer. The practice of having one kid also varies with the breed and the area. Barbari goats are usually made to kid twice in eighteen months.

In selecting goats for breeding, apart from the general health of the animals, their ancestry must also be taken into consideration to ensure a high-yielding progeny. The value of the sires lies in their potency for high milk yield, and since this can be judged by comparing the yield of their progeny with their dams, it is necessary to keep accurate milk records.

Goats reach the age of maximum efficiency at five to seven years. Observations made at Hissar showed that it was not economical to retain goats after their sixth lactation.

### Twinning

The incidence of twinning varies with the breed, environment and the number of kiddings. At the Hissar Farm, in an average year, there were 35 per cent singlets, 54.4 per cent twins, 6.3 per cent triplets and 0.4 per cent quadruplets among Beetal goats. In Jamnapari, it varies from 19 to 50 per cent, with an average at 35 per cent, while in Barbari it varies from 47 to 70 per cent.

## MANAGEMENT

Apart from observing general cleanliness and regularity in feeding, particular attention needs to be paid to the management of bucks, pregnant animals and kids to get very good results from the flock.

### Care of the Male

One good, strong and pure male, three or more years old, can serve from 50 to 150 females a year, provided he is always kept in

a good healthy condition. A buck is capable of service at eight to nine months, but should not be allowed to mate till he is 15 to 18 months old. He should not be allowed to serve more than about 30 females a year before he is three years old, as he would not be fully mature till then. It is always advisable to allow an interval of about two weeks between servings when the buck is quite young, and later, the interval can be reduced to two to three days.

The male should always be kept separate from the females. This prevents him from becoming unduly restive or excited, and will enable him to serve a larger number of females in a year. When a female comes into heat, she should be brought to the male and removed after she has been served once or twice.

A good male will be useful for breeding for as long as even twelve years, provided he is well-kept and properly looked after.

Proper grooming, where possible, is necessary to maintain the animals in good health. The clipping of superfluous hair every three months in the bucks helps to keep them clean.

### Care of the Female

As kids take just about five months to be born after the female has been mated, it may be possible to breed her as often as twice a year, and though she may come into heat a month or two after she has given birth, it is not advisable to mate her then, as it would mean an unnecessary strain on her and every care should be taken to prevent her from being run down.

### Care before Kidding

A female goat about to kid should be kept in a separate stall or compartment for about a week before the time she is 'due' to avoid the danger of being injured by other goats. Signs of approaching parturition are seen by the enlargement of the vulva, the goat becoming restless, lying first in one place and then the other, frequently changing positions, and bleating a great deal. The udder becomes tense, as it gets replete with milk.

When these signs are noticed, the mother goat should not be taken out to graze, but kept in a comfortable goat pen. She should be kept in a special compartment for about three to four days after kidding, after which she may be allowed to go out for grazing with the others.

## Care of the Kids

While giving birth to kids, the female is best left to herself, as she rarely requires any assistance. The first act of the newly-born kids upon gaining their legs, which they do if they are healthy and strong, is to make for the mother's teats. It is of no consequence if they do not succeed, or are slow in getting to the teats, as they do not require nourishment for a number of hours after birth.

If two, three, or more kids are born, it may be necessary to see that the smallest one gets sufficient milk because the stronger ones may not give it a chance to the teats fully. In case the udder is too full with milk, the weight and pressure of the same will cause pain to the mother, and hence a portion of it should be drawn away. As soon as the milk comes out freely, the kids should be put to the mother and if they are unable to draw the milk properly, the teats must be placed in their mouth. Once they have drawn in a few drops, they rapidly take to the teats and do not generally require help a second time. The milk that comes out of the udder has a yellow appearance for the first three days and is called colostrum. This must be fed to the kids, because apart from its nutritive value, it acts as a laxative and confirms immunity against diseases from which goats usually suffer.

Generally, male kids are heavier than the female ones. At birth, a male kid of the Beetal breed will weigh about 6 lb. 10 oz. and a female kid about 5 lb. 15 oz., on an average.

When kids are about two weeks old, they begin taking interest in nibbling green feed or dry fodder, and it is good to make some arrangements by which they can easily get small

quantities of these feeds. It is also good for the kids to get the maximum opportunity to be in the open air and sunlight. In the hot weather, an enclosure round a tree should be provided so that they may get sufficient air in shade. The enclosure should be big enough to provide sufficient accommodation for the kids to have plenty of exercise.

When the kids are about 2½ to 3 months in age, milk may be dispensed with, and when four months old, they should be completely weaned, as at this time it will be possible for them to get the solid food the older goats eat.

Male kids, unless they are required for breeding purposes, should be castrated at the age of 2½ to 3 months. Incidentally, castration also improves the quality of meat. If they are not castrated, the male and female kids should not be allowed to graze together.

## MILKING

As in the cow, the milking of goats is an art, and has to be learnt by practice. A good milker draws out the milk quietly and completely. Goats are milked either by 'stripping' or by 'fisting'.

'Stripping' is done by firmly seizing the teat between the front of the thumb and the forefinger and drawing them down the length of the teat, simultaneously pressing it to cause the milk to flow down in a stream.

'Fisting' or full-hand milking is done by grasping the teat with the whole hand and pressing it against the palm with the fingers. The teat is compressed and relaxed alternately in quick succession. Between the two, fisting is to be preferred, unless the teats happen to be very small.

Whatever the method employed, it is essential to see that milking is performed with the least possible discomfort to the animal. It is necessary that both the teats are uniformly milked.

Otherwise, it may lead to a disparity in their sizes. The practice of milking one teat and leaving the other for the kid is not desirable.

### Regularity in Milking

Regularity in the hours of milking is a point of great importance if an even and constant supply of milk is desired. Besides food and water, nothing influences the yield of milk more than this factor. The common practice is to milk goats twice daily, but the period between morning and evening milkings should be the same as far as possible.

### Milking Methods

Milking is done by the milker by sitting either behind the goat or at its side. Both methods are in vogue in India, but the latter is more convenient and is the cleaner method. The best position is to have the goat on a raised platform, about two feet from the ground, and sit on a low stool behind or on the right side of the animal. With a little training, the goats get accustomed to this practice. Milking should be carried out as quickly as possible, as thereby more milk is obtained and the animal does not get restive as it does when the milker takes too long a time to milk. In cows, it has been shown that quick milking produces 2 to 13 per cent more milk, and this may be true in goats too.

Before milking, the milker should wash his hands with clean water, preferably with soap. The udder and teats should then be wiped with a clean damp cloth to remove all dirt, etc.

All utensils should be washed in cold water after milking, then well rinsed in warm water to which soda has been added, and finally rinsed in clean hot water or placed for a few minutes in boiling water or steam. They should then be placed mouth downwards until required again for use.

Milk absorbs taints and odours very rapidly. Every care should, therefore, be taken to prevent its pollution. Milk drawn

and kept under cool and hygienic conditions remains wholesome for longer periods than when such conditions are not maintained. The ideal would be to milk the goats in a proper milking shed with a brick or cement concrete floor, but under the existing conditions in this country, such a milking shed for goats would be a luxury far beyond the means of an ordinary goat-breeder.

Even if milking is performed in the open or in a *kucha* shed, it should be seen that the place is kept clean and water is sprinkled over the ground to settle the dust.

# GOAT PRODUCTS

## Milk

The yield of milk in goats varies with the individual and the breed. The milk yield of Indian goats varies from ½ to 10 lb., and the butter fat is in the region of 4.5 per cent.

*Composition* : The composition of goat's milk may vary with the individual, the length of lactation, the number of lactations and seasons. The average composition of goat's milk is 4.9 per cent fat, 9.30 per cent solids-not-fat, 4.33 per cent protein and 0.89 per cent ash. The fat percentage has been reported to be 5.20 in Jamnapari and 4.90 in Barbari goats at the Mission Farm, Etah.

*Flavour* : Usually, some flavour is attributed to goat's milk, but many exponents of the goat's milk state that there is no such flavour at all, and if there is any, it is due to the goat coming in contact with the males. The author had occasion to test the milk of the famous Bhakarwal goats maintained in their natural condition in the Kashmir hills and found it free from any undesirable flavour, and it was difficult to distinguish it from cow's milk.

Goat's milk is specially valued because it resembles human milk in its composition. It is easily digestible, and therefore, is highly suitable for infants and invalids.

## Goat Hair

There are various types of goat hair coming from different types of goat breeds. *Mohair* is the long lustrous hair-covering of the Angora goat which originated in Asia Minor, and is a hair fibre of special importance.

Some work has been done in this country to improve the local white-haired hill goats at Hissar in the Punjab and at the Pipal Koti Farm in Uttar Pradesh by crossing them with the Angoras. The hair coat of the crosses is finer and in the third and fourth crosses it resembles *mohair*, but there is reduction in the size of the animals.

*Pashmina* is obtained from the Kashmir or Pashmina goat which is found in Ladakh tehsil of Kashmir, Indo-Tibetan border in Tehri and Garhwal districts in Uttar Pradesh, as well as in parts of Tibet, Persia, Mongolia and Turkistan. It is only the undercoat which is used for making shawls, and the famous 'ring shawls' of Kashmir were also made from *pashmina.*

The hair of the common goat is seldom used in the manufacture of textiles, but is quite often used in the making of ropes, coarse blankets or bags for carrying grains on the hills.

The system of clipping varies from area to area. For instance, Tehri goats are not clipped until they die or are clipped occasionally when goat-hair rope is to be made, while in Kashmir, the Bhakarwal goats are clipped regularly. The plains goats are usually not clipped, except for decorative purposes. In the case of the Jamnapari, the hairs in the hind region are clipped by the breeders to prevent matting and soiling.

## Meat and Skin

Goat's meat is preferred to mutton in this country, and hundreds of thousands of goats are annually slaughtered for meat. The value of meat produced in the country has been estimated at Rs. 30.5 crores, at the rate of Rs. 70 a maund. Goat skins form

a major item of export, and it is estimated that nearly 274.9 lakh goat skins are produced in India each year, 233.2 lakhs of them from slaughtered animals and 41.7 lakh from fallen ones.

**Manure**

Goat manure is valuable to its owner, as by leaving his goats on the field of the farmer, he gets his maintenance and some cash in the bargain. It is said that folding 2,000 goats on an acre of land for one night leaves a good dressing of manure on it.

# GOAT DISEASES

Generally, goats are very hardy, and unlike other animals are subject to comparatively a few serious diseases. In India, not much attention was paid to goat diseases until recently, their economic importance being lesser than that of cattle diseases. For the last few years, however, a greater attention is being paid to the treatment of goat diseases, especially on Government farms.

The most common diseases goats generally suffer from are goat pox, contagious pleuropneumonia, parasitic and bacterial pneumonia and diseases like indigestion and diarrhoea. The exact incidence of these diseases in the field is not known, because of the present not very sound system of reporting contagious diseases, some of the outbreaks going unattended. The nomadic habits of goat-breeders are also a handicap in ascertaining a correct information on disease incidence.

Parasitic infection in goats, however, is fairly common, and it has been responsible for heavy mortality in a number of instances.

**Goat Pox**

It is a fairly common disease, and lesions are usually found on the udder of goats in milk, chiefly of the recently kidded ones. The lesions in the form of round nodules, are present on the teats and udder, but may spread to the mouth or lips of the

suckling kids. The man who milks the goat may also get sores on his fingers. Due to the painful condition of the udder, the affected goat offers resistance to milking. The milk yield generally goes down.

In such cases, affected animals should be isolated, and hot fomentation given before milking to the udder at least twice a day and the udder thoroughly dried. Application of mild antiseptic ointments such as sulphanilamide ointment quickens recovery and prevents secondary infection. A dose of epsom salt twice a week is also useful.

**Contagious Pleuropneumonia**

This is one of the serious specific diseases of goats and affects them at all ages. Affected animals have cough, sneezing and nasal discharge, in addition to general symptoms such as loss of appetite, etc. It is essential that these animals are isolated and given proper care and nursing. As a curative, some organic arsenic preparations have been found to be effective. Now a vaccine is available which is suitable for immunisation of animals even in the face of an outbreak. The outbreak should be reported to the nearest veterinary hospital to enable the Veterinary Assistant incharge to take necessary measures to control the disease.

**Anthrax**

This is another serious specific disease which affects a large number of goats. Appearing suddenly, the disease takes a heavy toll. It also is communicable to human beings, and as such extra precautions have to be taken in dealing with the disease. Animals sometimes die within a few minutes of infection. The disease usually breaks out when goats are on the pasture, and it is observed that the disease follows a hot dry summer when there is a scanty growth of herbage. The disease is very common in Madras, Mysore and Bombay States, though cases occur almost everywhere.

Goat Pox Lesions
on the Udder

In goats, the disease usually occurs in an acute form and causes unsteady gait, trembling, restlessness, difficult breathing, bloody discharge from natural body openings and convulsions preceding death. Immunity against the disease can be provided by using the vaccine available with the Veterinary Department and in endemic areas, large scale vaccinations are useful in preventing the occurrence of the disease.

**Foot and Mouth Disease**

This disease occurs in many parts of India. Generally, the foot lesions are more common than the mouth lesions. It is characterised by the formation of blisters on the mucous membranes of the tongue, lips, cheeks, palate and other tissues of the mouth and on the skin between and above the cleft of the feet. At times, it is accompanied by diarrhoea and pneumonia.

The disease appears usually in the hot months or in the rainy season. The movement of flocks for trade purposes and the

droppings of affected animals contribute a good deal to the spread of the disease.

In order to control the outbreak, the affected goats should be isolated. Lesions in the mouth should be washed with potassium permanganate, while the foot lesions should be dressed with phenyle or copper sulphate lotion. Sometimes, the disease occurs in cattle, sheep and goats at the same time, while in other outbreaks, it is confined only to one or two of the species.

**Tuberculosis**

Until recently, the goat was regarded immune to tuberculosis; but recent investigations have shown that this disease does occur in goats, and is of great importance on farms where goats are kept in large numbers and are closely herded. It is therefore advisable that goats should be tested against this disease by what is known as 'tuberculin test' as a routine on farms where large herds of goats are kept.

**Johne's Disease**

This disease, like tuberculosis, occurs rather infrequently, but cases *have* been recorded in some parts of the country. It is a disorder of a wasting character, and is caused by bacillus similar to that of tuberculosis.

The course of Johne's disease is very slow and the first signs are often unrecognised. Well-fed animals lose flesh and do badly, but show no signs of fever, cough, or loss of appetite. Later, they suffer from periodical attacks of diarrhoea which increases in severity and frequency until the animals become terribly emaciated and die of starvation. The disease can be diagnosed by 'Johnin test' carried out by a veterinarian.

## NON-CONTAGIOUS DISEASES

As has been mentioned before, a number of non-contagious diseases also affect goats. They are usually of the respiratory or the digestive system. Among these, pneumonia, *pitto* and

*gillar* and other helminthic infestations are the more common ones.

### Non-specific Pneumonia

It is one of the most common diseases which attack goats. It may be an outcome of an ordinary cold, while sometimes long journeys by train or on foot under unfavourable conditions also may result in pneumonia.

The affected animals show high temperature, loss of appetite, hard breathing and sometimes cough. Such an animal should be immediately removed to some dry, warm place where plenty of fresh air without draught is available. Careful nursing should be done and plenty of fresh drinking water should be supplied. Dry and hot feeds should be withdrawn and soft or liquid nourishing food, in small quantities and at frequent intervals, should be given instead. Necessary advice regarding treatment should be obtained from the nearest veterinary hospital.

### Parasitic Infections

Among goats the most serious losses are due to internal parasites. Although deaths due to these parasites are not infrequent, the losses result not so much from deaths from gross parasitism as from 'loss of condition', unthriftiness, anaemia and other adverse effects. This loss in terms of money will mean several lakhs of rupees per annum.

The principal internal parasites in goats are roundworms, tapeworms, flukes and protozoa. These infest internal organs such as the rumen, intestines (both large and small), liver and lungs.

The roundworms require no intermediate hosts for the completion of their life-cycle. Generally, the eggs of these worms are passed out in the droppings of the infected animals, and depending upon the conditions of temperature and moisture, develop into infective larvae in a few days to few weeks in the

pastures. These larvae, which are ingested by the goats, develop into mature worms.

The flukes are flat, leaf-like parasites which usually occur in the liver, bile duct, gall bladder and rumen. As an intermediate host, usually the snail plays an important role in their life-cycle.

As a precaution against liver fluke infestation, goats should not be grazed on low ground containing stagnant water during the rainy season. Low areas harbour snails, which carry the intermediate stage of flukes and spread the disease on being ingested.

Tapeworms occur both in adult and larval forms. They pass out eggs and gravid segments which when dry liberate more eggs. On being ingested by a suitable host, the eggs develop into the intermediate stage and the goats become infested by swallowing such larvae.

The general symptoms of worm infection are unthriftiness, loss of weight, diarrhoea, anaemia manifested by paleness of the mucous membranes of the eyes and the mouth, developments of a pot-belly and often a soft swelling under the jaw. Control of these worms depends on a thorough knowledge of the life-history of the parasites and a periodic use of suitable drugs. The destruction of the internal host should be carried out wherever possible.

Various drugs such as phenothyazine, carbon tetrachloride, arecanut, extract of the male fern, oil of turpentine and copper sulphate have been found effective in the treatment for these parasites.

Phenothyazine is becoming extensively popular because of its effectiveness and cheapness. The dose recommended by the manufacturers for goats is 15 gm. per goat of average size, for a routine periodic treatment and 25 to 30 gm. for curative treatment.

The following mixture, which is quite cheap and easily

prepared, has proved to be a good preventive for sheep at the Government Livestock Farm, Hissar, and can safely be recommended for extensive use to all goat-breeders :

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| Copper sulphate | 8 oz. |
| Powdered mustard | 4 oz. |
| Water | Sufficient to make up 3 gallons |

The solution should be freshly prepared and the ingredients properly dissolved. Two to two and a half ounces should be given once a month according to the size of the goat.

**'Pitto' or 'Gillar'**

The disease occurs due to heavy infection by an immature parasite. The affected animals become dull, weak and anaemic with pallid mucous membranes. In advance cases, a swelling of the throat is present which appears in the evening and considerably subsides in the morning. Later on, persistent foetid diarrhoea develops. Sometimes, there is also a rise in temperature and the animal dies within a period of 10 to 15 days, while in other cases there is sudden death, such cases being usually of heavy infection. Treatment with copper sulphate and carbon tetrachloride has given encouraging results, but it should be carried out by a veterinarian.

**External Parasites**

Goats and kids in particular are prone to lice and should be protected against this pest by use of 'Gammexane' which should be used in prescribed strength as dusting powder or as dip.

The mortality among various breeds of goats due to diseases is not so high in adult goats as it is in kids. The mortality is less in non-milch breeds than in milch breeds, where, again, the incidence is higher among heavy yielders. In kids, the mortality is more in winter than in the summer. Digestive and respiratory diseases are a common cause of mortality in the kids and uterine diseases in goats, specially in the first kidders. Special precautions are therefore required to be taken in rearing kids.

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